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Flexibility and Alternative Corporate Strategies

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Résumé de l'article

Nous discutons ici des formes variées de stratégies d'entreprises développées dans le cadre de la restructuration industrielle et de la transition vers la production flexible. Nous démontrons que cette transition vers de nouvelles formes d'organisation de production ne mène pas à un modèle uniforme de développement. Elle est plutôt caractérisée par la variété et la relativité, pointant ainsi vers les différents chemins que la restructuration industrielle peut suivre.

L'analyse se concentre sur des stratégies de production flexible développées dans des entreprises à différents types et stades de production. Il ne s'agit pas ici d'établir une typologie exhaustive des stratégies, mais plutôt d'élaborer le concept de variété dans l'organisation flexible de la production. Les stratégies des firmes sont classées selon la taille de l'entreprise et la structure organisationnelle. Pour chaque type de stratégie, nous analysons quatre options : les réseaux interfirmes, l'organisation interne de la production, le marché du travail et l'innovation. Dans le contexte de cette variété de modèles de développement industriel, nous distinguons entre différents types de firmes ayant implanté différentes formes d'organisation de la production. Dans les grandes entreprises, on retrouve trois types de résultats. La grande entreprise verticalement désintégrée. Cela implique la conversion d'économies internes de gammes ou de variété (la production d'un volume important de produits variés et reliés) en économies externes de variété. La principale caractéristique ici est d'accroître l'externalisation de la production et l'exploitation des économies de variété en fragmentant le processus de production en unités et stades séparés et en opérant à l'intérieur d'unités de production plus petites et plus flexibles.

Les réseaux interfirmes jouent un rôle important dans la structure organisationnelle de ce type d'entreprise. De plus, la technologie flexible est combinée avec l'implication du travailleur dans la production, tendant ainsi à établir des contrats rigides de salaires. D'un autre côté, les innovations portent tant sur le processus que sur le produit. La grande entreprise flexible de production de masse. Cette catégorie comprend des entreprises à économies d'échelle qui combinent la production externalisée et la production interne de masse. Elle vise à atteindre un équilibre entre la production interne de masse et l'offre d'une grande diversité de produits ou de pièces. C'est une combinaison d'économies internes d'échelle et d'économies externes de variété du système de production à travers une décentralisation partielle.

Le développement d'un réseau interfirme par une collaboration serrée et des contrats avec d'autres firmes, surtout petites, joue un rôle important dans la production et l'offre de pièces de remplacement, d'accessoires, de composantes et dans l'innovation du produit. L'organisation interne de la production ressemble à celle du type précédent en ce que la flexibilité est combinée avec l'implication des travailleurs dans la production. Cependant, les contrats salariaux sont ici plus flexibles vu que les négociations collectives se font surtout au niveau de l'entreprise.

La grande entreprise techniquement flexible. Ici, il s'agit d'économies internes d'échelle ou de variété. La restructuration du processus de production origine surtout des changements dans l'organisation interne de l'unité par l'automatisation flexible et l'automatisation programmable. On obtient la flexibilité en restructurant l'organisation interne de la production en relation avec les nouvelles technologies plutôt qu'avec des réseaux interfirmes. Les innovations proviennent de l'intérieur de la firme. La flexibilité par l'automatisation programmable se rend souvent à l'automatisation complète. Cela donne priorité à la machine flexible plutôt qu'au travailleur flexible. Le résultat est que les opérateurs sont moins susceptibles d'être impliqués dans le processus de production. Cette vision technique du travail ramène des relations industriellesayloristes combinant une flexibilité fonctionnelle limitée à un marché du travail aux contrats salariaux flexibles. Dans les entreprises plus petites, il est aussi possible d'identifier trois types d'activités et de développement.

La petite entreprise à créneau spécialisé. Il s'agit de firmes relativement petites produisant de petites quantités de produits diversifiés de haute qualité et de haut design destinés à des marchés segmentés. Elles ont l'avantage de satisfaire les exigences de demandes individualisées en privilégiant la production par métier basée sur les habiletés techniques des travailleurs et sur de petites quantités de production. Le système est fondé sur de grands réseaux serrés de collaboration entre des firmes interdépendantes spécialisées dans différents stades de production. Les relations de travail dans ces unités sont basées sur l'organisation flexible du travail. Le marché du travail, influencé par des paramètres sociaux plus larges, tend à reposer sur des contrats salariaux rigides.

Les entreprises à créneaux spécialisés dans les secteurs traditionnels favorisent plus l'innovation des processus que l'innovation dans les produits. La petite entreprise à haute technologie. Il s'agit ici de petites entreprises spécialisées orientées vers la recherche et le développement pour promouvoir l'innovation dans des produits de haute technologie. Elles sont capables de créer, par des innovations constantes de haute technologie, de nouveaux marchés spécialisés en combinaison avec une grande flexibilité dans l'organisation de la production à l'intérieur des unités et une organisation flexible des réseaux interfirmes sur la base d'alliances stratégiques.

Ces réseaux sont cependant différents du précédent. Ils ne se centrent pas sur le plan local mais plutôt sur le plan international afin de favoriser l'échange de connaissances techniques et de personnel. En ce qui a trait aux relations industrielles, ces entreprises font preuve de flexibilité dans l'organisation du travail et sur le marché du travail eu égard à la libre mobilité de la main-d'œuvre hautement spécialisée. Ces entreprises sont orientées vers l'innovation du produit.

L'entreprise sous-traitante. Celle-ci est caractérisée par une technologie relativement traditionnelle et par un bas niveau d'activité d'innovation et de main-d'œuvre qualifiée. Elle est cependant flexible dans sa régulation de la paie, des heures de travail et du travail saisonnier ou occasionnel. Une forme relativement fordiste classique de sous-traitance survit dans l'organisation de la production. Les réseaux auxiliaires des entreprises appartiennent surtout de l'externalisation de la production de grandes firmes. Ils n'impliquent pas des relations de coopération entre les sous-traitants eux-mêmes mais plutôt des relations hiérarchiques avec des unités plus larges. L'organisation de la production prend la forme suivante : technologie traditionnelle, implication des travailleurs et organisation flexible du travail. De plus, le marché du travail est ici très flexible. Cela implique une baisse d'emplois et la présence d'emplois occasionnels et à temps partiel selon les fluctuations de la demande. D'un autre côté, les innovations ne sont pas un aspect significatif de la production.

Nous concluons que les choix stratégiques des entreprises sont plus influencés par des facteurs sociaux-économiques locaux que par des modèles globaux. De plus, il y a plusieurs formes de flexibilité avec différentes possibilités et perspectives à travers les différentes entreprises, phases et stades de production.

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Flexibility and Alternative Corporate Strategies

ELENA SEFERTZI

This article discusses various and alternative forms of corporate strategy developed with respect to current industrial restructuring and transition towards flexible production. Corporate strategies are distinguished according the size of firms and their organizational structure. The point is not to establish an exhaustive typology of strategies but to elaborate the concept of variety in flexible organization of production and markets. For each type of corporate strategy four major options are analysed: interfirm networks, internal organization of production, labour market, and innovation. The article concludes that the strategic choices made by firms are influenced more by local socioeconomic factors than by global models which apply to all firms' sites and operations.

Since the crisis of the 1970s, business restructuring strategies have been turning towards more flexible forms of production organization. In the transition to new flexible forms, the hitherto predominant fordist production model — based on mass production, economies of scale, and the large vertically integrated firm — has been discarded owing to its rigidity and inefficiency in the new economic climate. Though some people question it, many nowadays consider a diametrically opposed model — that of “flexible specialization”, which is chiefly characterized by diversification of the product, economies of scope, vertical disintegration, and cooperation between relatively small firms — to be the predominant future form of production, owing to its ability to adapt swiftly to fluctuating demand.

The changes which are taking place in production organization are now unmistakable. But the question is: what form the transformation is to take? Does it lie in flexible specialization and the inability of the large

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mass-production firm to survive, or is it a transition involving many forms and aspects of flexible restructuring?

The following analysis concentrates on the flexible production strategies developed in firms of different types and at different stages of production. The point is to establish the various and alternative forms flexible restructuring takes among different firms, among production units within the same firm, and among phases and stages of production within the same unit.

FLEXIBILITY AND TYPES OF FIRMS

A number of factors must be considered when trying to establish the various forms of flexible production systems which companies use. The firms themselves are distinguished by size, sector, degree of automation, type of technology, whether they produce consumer or intermediate goods, their production process (process production, assembly-line, small or large batches, project production), the demand for their product (diversified and variable or mass and constant), and input-output system. Flexible production systems also have to do with flexibility at different levels, such as the internal production organization (including flexible equipment, flexible methods and processes, organization of work in terms of functional flexibility, product variety), the labour market (demand for new skills and numerical flexibility), interfirm relations (subcontracting, joint ventures, joint R&D, just-in-time delivery), process and product innovation, or demand flexibility (see Sayer 1989; Komninos 1992).

The plethora of possible combinations of levels of flexibility and company characteristics makes an exhaustive typological analysis extremely difficult. Thus, for the approach to firms' various strategies, a distinction between core firms and suppliers will be followed. The distinction relates both to different sizes of firms (large ones tending to be core firms and smaller ones suppliers) and to the notion that the core firm directs productive and nonproductive activities, while the supplier operates on the basis of interrelations with core firms. The distinction is also significant in that, in any discussion of flexibility, size is a determining factor in a firm's flexibility or lack of it.

The following typological assessment is not exhaustive. Its purpose is to assess how much industrial restructuring varies in relation to flexible production.

The Large Flexible Core Firm

Since the crisis of the 1970s, the large mass-production industrial firms organised on a taylorist basis have been confronted with a number of

problems. These mainly concern: (i) market and demand, i.e., fluctuations in demand in relation to the fluidity of the markets, the intensity of competition, and macroeconomic changes; (ii) the organization of production process, chiefly with regard to balancing input and production, coordinating flow and the distribution of input among interdependent production stages, and balancing output and demand; and (iii) reduced rate of profit, which is chiefly a result of reduced productivity (Boyer and Mistral 1978; Coriat 1979; Hirst and Zeitlin 1990).

A significant literature on manufacturing industry, in both traditional and new industrial sectors (automobile, chemicals, electrical appliances, electronics, engineering, textiles, etc.) (for example, see Freeman 1987; Haug 1986; Heaton 1986; Morgan and Sayer 1988; Schoenberger 1986, 1987), shows that many firms have elected to deal with these problems by adopting flexible restructuring strategies combined with the opportunities offered by new technologies (Ayres and Miller 1983; Murray 1985).

However, the introduction of new technologies has not led to a uniform model of flexible production. Depending on their type (process production or assembly-line, for instance), and the general socioeconomic framework in which they operate (i.e., market competition and penetration), large firms implement different forms of flexible organization, or various combinations of flexible systems, or even combinations of flexibility and rigidity (as I attempt to examine in what follows). Furthermore, insofar as a large firm usually comprises several production units, it can adopt various forms of flexibility in different units simultaneously. In view of all this, it is possible to detect signs of certain trends and tendencies towards an overall restructuring strategy.

Two basic parameters which determine different types of flexibility are the degree to which production is externalized, which is connected with interfirm relations, and the advantage of economies of scope or scale over the internal organization and utilization of capital (Storper and Harrison 1991). A combination of these two parameters can result in at least three types of strategies: (i) vertical disintegration, which concerns external economies of scope; (ii) flexible mass production, which concerns external economies of scale; and (iii) technical flexibility, which concerns internal economies of scale and/or scope. It must be pointed out that in a multiunit firm it is possible for all three strategies to coexist, to a greater or lesser extent. However, the emphasis given to one or another form of flexible strategy may well determine the firm's general orientation.

Type 1: Vertical Disintegration

A significant number of large production units with internal economies of scope (i.e., production of important volume of diverse range of related

products) have adopted the strategy of vertical disintegration. The basic feature of this particular strategy is increased externalization of production accompanied by exploitation of the advantage of economies of scope, by fragmenting the production process into separate production units and stages and operating in smaller and more specialized production units. The formation of expanded networks of cooperating firms and subcontractors plays an important part in this process.

The conversion of internal economies of scope to external economies is the basis of a rationale which combines small firms' flexible abilities to produce small batches and diversified products, efficient input of special supplies, ability to cope with uncertainty, rapid development and incorporation of innovations through R&D cooperation agreements, access to more and diversified markets, and swift response to fluctuating demand (Aoki 1986).

It is essential to note at this point that vertical disintegration does not entail decentralization of capital. The trend towards vertical disintegration also applies to highly centralized sectors under the same financial proprietorship (Leborgne and Lipietz 1990).

Many large firms in such countries as Germany, Italy, and Japan (including Bosch, Olivetti, Benetton, Montedison, and Xerox) are restructuring production through disintegration strategies. According to Sabel (1989), this type shares common characteristics with the organizational and spatial structure of firms in industrial districts. However, apart from the fact that disintegration does not always entail spatial centralization, as in industrial districts, another important difference is that in the latter case there is collective controlled regulation, whereas in the former there is a more or less unequal distribution of power and control by one core firm (Amin and Robins 1990).

With the introduction of flexibility, the organization of production, both within the unit and at the interfirm network level, depends to a great extent on flexible labour rather than on fully automated production systems. Organization through systems such as *Kanban*, total quality control, quality circles, just-in-time, atelier, and teamwork makes manual worker involvement in production a determining factor in technical changes, improved quality, and higher productivity (Sayer 1986).

The high degree of skills, responsibility, and spontaneous worker participation required by these organization systems also determines the nature of the labour market. A typical feature of such firms is that the work combines functional flexibility with limited flexibility in labour market terms. The negotiation of contracts between employer and workers varies with the firm, and also with the broader social context in which the relationship

operates. According to Lipietz (1992), worker involvement in production may be negotiated on four levels, which determine the degree of flexibility of the wage contract: the individual level (Californian model), the firm level (Japanese model), the sectoral level (German model), and the society level (Swedish model). The more general the level of negotiation the less flexible the labour contract. All the same, it must be stressed that limited flexibility of the labour market in the internal organization of these firms may be counterbalanced by considerable flexibility at the network level (for instance, a highly-paid, unionized, skilled workforce inside can offset low-paid, nonunionized, unskilled work outside).

Type 2: Flexible Mass Production

This type comprises scale economies firms which combine strategies which externalize production and internal economies of scale. It is intended to achieve a balance between internal mass production and the supply of a wide-ranging diversity of products. In other words, this is a combination of internal economies of scale and an external scope-economy production system (Storper and Harrison 1991). The externalization of production takes the form of partial decentralization, through a centrally-controlled, just-in-time network of subcontracts and supplies known as the "Toyota City" organization model (Sayer 1986).

The development of an interfirm network through close collaboration and contracts with other, chiefly small, firms plays an important part in the production and supply of spare parts, accessories, and components, and also in product innovation. Partial decentralization of production enables a mass-production firm which targets fluid mass markets, on the one hand, to effect changes and innovations in the product without itself making any special investment, and on the other to be flexible to changing demand and varying customer requirements. Flexible mass production thus allies the advantage of producing long runs with the possibility of diversifying the quality of the product. Typically, subcontracts and supplies relate chiefly to parts of the final product which require frequent changes. One classic example of this sort of strategy is found in the automobile industry, where long runs of standardized components, such as engines and gear boxes, are produced in the factory, and diversified products are supplied for the assembly of the final product (Schoenberger 1987).

Examples of such strategies — apart from many firms in the automobile industry, such as Toyota, Nissan, and General Motors' Saturn factory — are also found in firms in other industrial sectors, such as Kodak (Sabel 1989), and in large textile factories in Britain (Philimore 1989).

Similar, though limited, examples of the adoption of production diversification strategies through the input of diversified products in association

with small firms are also found in highly integrated production, as in the case of steel industry in the Ruhr (e.g., Thyssen and Krupp, for the manufacturing of environmental and antipollution equipment) and chemicals firms in the Rhine-Main region (e.g., Bayer, for the development of biotechnology) (Holland 1990).

The internal organization of production resembles that of the previous case in that flexibility is combined with worker involvement in production. However, wage contracts are more flexible, as negotiations between employer and employees (through the union) are conducted chiefly at company level. In this case, the wage contract (for steady and highly-paid work) favours the skilled and semiskilled sector of the workforce (Lipietz 1992).

Type 3: Technical Flexibility

Strategies of restructuring through technical flexibility are employed where there are internal economies of scale and scope. Flexibility in the production process arises mainly out of changes introduced into the internal organization of the unit through "flexible automation" (Perez 1985) or "programmable automation" (Boyer and Coriat 1986). Basically this is a recomposition of fordist mass production along flexible lines, with the production lines reprogrammed and the production process distributed among phases with integrated functions. This makes it possible to modify the process of flow-line production and to establish continuous production of diversified products. In this sense, such firms are also described as "neofordist" (Leborgne and Lipietz 1988, 1990).

Interfirms networks can play a supplementary or even a major role in assembly processes (as in Fiat's automobile factory in Turin), or no part at all in vertically integrated or process industries (such as the majority of petrochemical and steel industries). In every case, however, priority is given to flexible internal organization of production through flexible interaction between process and product (Coriat 1991).

This type may include economies of both scale and scope. These cases will not be examined separately because of the specific nature of the new technologies on which these firms base their restructuring. Flexible reprogrammable machines, such as robots and computer numerical control machine tools, are able to produce a variety of new products or old products in a new way incorporating new features (Gertler 1988).

In firms which produce a diverse range of related products, economies of scope are achieved when certain inputs can be used simultaneously to produce different products in one production line (e.g., in the steel industry, where a range of different products are produced from iron in a flow-line process; or in the plastics industry, where basic chemicals are turned

into plastics and consumer goods; or in the automobile industry, where cars and light trucks are turned out on a production line). In this case, the flexible machine has immediate applications. Since it is able to produce a variety of products from common inputs, its efficient use depends on the production of products on marginal scales.

It must be pointed out here that it is more expensive to introduce flexible technology than conventional automation, which means that it must be used constantly and for long runs, though not necessarily for the same product. So even when there are significant economies of scope, economies of scale are important for the total production (Coriat 1991; Leborgne and Lipietz 1990).

In the case of economies of scale, which are achieved by lengthening the production of a single product into a production line using the same equipment, the problem arises out of fluctuating demand for mass products. The tendency here is to seek economies of scope by diversifying the product, and this is done by producing families of similar models based on a large number of common, standardized and mass parts. This method offers the advantage of long run production and at the same time, by developing the product and changing its features, allows adaptation to fluctuating demand.

This is a similar case to flexible mass production (the advantage of long runs is increased by diversification of the product), but differs in that flexibility is achieved by restructuring the internal organization of production in relation to new technologies, rather than through networks. By making it possible to effect direct changes to the external features of a product, flexibility permits both a "dynamic" diversification of the product and a diachronic perspective for valorisation of capital by lengthening the product's life cycle (Coriat 1991).

Flexibility of internal economies of scale and scope through programmable automation frequently tends to go for full automation in the form of computer-integrated manufacturing systems. These give priority to the flexible machine rather than to flexible labour, with the result that the immediate operators are less likely to be involved in the production process.

The technical division of labour which these methods entail tends to restructure taylorist industrial relations on the basis of labour control, dissociation of design from direct production, and the development of hierarchical structures. From the top downwards, these relations involve a small group which designs production, a group of multiskilled and multifunctional workers who are highly paid and have a steady labour contract, and a large number of unskilled or deskilled, low-paid workers. In this way duality in labour is reproduced (Lipietz 1992). As far as the unskilled workers are

concerned, this neotaylorist form combines limited functional flexibility with a labour market which is flexible in terms of wages contracts.

The Small Flexible Supplier Firm

The transition to flexible forms of production has created new activities and openings for small firms. The fragmented production, production of small batches of specialized products, swift response to fluctuating demand, and craft structure and operation which were, and remain, innate features of small industry have always given its activities a certain flexibility (Lyberaki 1991; Murray 1987; Piore and Sabel 1984). With the new developments, however, small firms now have an active part to play in development.

The parameters of the social framework on which their dynamics are based are: (i) changes in demand for individuality, quality, and diversification in consumer goods, which make it even more crucial to adapt rapidly to changes in demand and to orientate production towards niche markets (Cohen and Zysman 1987; Lash and Urry 1987); (ii) the linking of production to innovation and R&D, which has opened up new horizons for small firms' activities; (iii) technological changes relating to the introduction of microelectronics and production methods, which have made it possible for production to respond to specific and differentiated demand; (iv) the development of extensive interfirm agreements, involving both joint ventures and subcontracts, which have expanded the role of small firms (Scott and Storper 1986); and (v) the public sector's support for the development of small innovative firms, in the form of special incentives (for instance, the provision of venture capital) and organized research and production projects, such as science parks and "technopoles" (Kominos and Sefertzi 1992; Sefertzi 1992).

In the new context of the smaller industrial units' activity and development, it is possible to distinguish at least three types of small firms connected with various forms of flexibility: those in market niches, high technology firms, and subcontracting firms.

Type 1: Small Firms in Market Niches

The term "market niches" is used in relation to the specialized and relatively small firm whose production of small batches of diversified products of high quality and design is directed at segmented markets. These firms may be suppliers of products (input of components, for instance) to core firms and/or serve their own personal consumer market.

The flexibility (and competitiveness) of these firms lies mainly in their ability to meet quickly the diverse requirements of individualized demand.

This is achieved through: (i) craft production, which is largely based on the technical skill of the workers and on small batches of production; (ii) the introduction of flexible technology and labour; (iii) a grouped, rather than linear, arrangement of work stations; and (iv) distribution of the labour process among interconnected and specialized production stages and firms (Amin 1989; Brusco 1982, 1986). A small firm of this type preserves its autonomy, even when it acts as a supplier to core firms, owing to its autonomous relationship with its customers and its high degree of specialization (Storper and Harrison 1991).

Typical examples are the flexible specialization firms in the "industrial districts" of the Third Italy. Indeed, the model of flexible specialization, as analyzed by Piore and Sabel, basically relates to the industrial districts of precisely this region. The development of a unique local production system (or "system area", as Garofoli [1986] terms it) in the form of an integrated local network of specialized firms and core firms forms the framework for the support and the expansion of the activities of flexible specialization firms. The system is based, on the one hand, on extensive and cohesive networks of collaborating and interdependent firms specializing in different production stages, and, on the other, on local institutions and machinery for social consensus and organization of infrastructures for the transfer of technical knowledge, market information, product promotion, etc. As Storper and Harrison (1991) note, external economies of scope, through the total system, are transformed into external economies of scale. Labour relations within the units are based on flexible organization of labour, and the labour market, which is determined by broader social parameters, tends to rest on rigid wage contracts (Amin 1989; Becattini 1991; Brusco 1982; Hirst and Zeitlin 1990; Piore and Sabel 1984; Storper and Scott 1989).

Similar instances of small firms which target market niches, but are not connected with the expanded and cohesive local production systems of the Third Italy, are found in craft firms producing machine tools in Japan, Germany, and Denmark; small textile companies in Denmark and Germany; furniture manufacturers in Denmark; metalworking firms in Sweden; and producers of automobile components in Germany (Sabel 1989; Storper and Scott 1989).

Type 2: Small High Technology Firms

Demand for innovation and the advent of automation have created a need for specialized know-how in high technology and R&D. Whereas they were formerly included among the core activities of large firms, these now tend to be decentralized to specialized firms. We thus note the appearance of the small specialized firm which is orientated towards R&D to promote

innovation in high technology products and production methods. It may be a spin-off from a large firm or self-made.

The flexibility of these firms lies mainly in their ability to create, through constant high technology innovations, new specialized markets, in combination with great flexibility in the production organization inside the units and a flexible organization of interfirm networks on the basis of strategic alliances (Cooke 1988). As far as industrial relations are concerned, such firms display flexibility in their organization of labour and in the labour market. The model of negotiation of these relations, as Leborgne and Lipietz (1988: 269) describe it, consists in "an individual bargain between the involved worker and management in sharing out improvements, through bonus payments, career advantages, and so on."

Interregional and intraregional networks play an important part in these firms' development and operation. They also tend to be spatially centralized, thus creating powerful poles of technology. The centralizing tendency arises, on the one hand, out of the necessity for spatial proximity and strengthening of the links between the functions of design, product development, and production which the rapid and constant innovations in the product demand, and, on the other, out of the need for link-ups between firms for common research programmes, joint ventures, mutuality of risks in R&D, finding skilled and technical staff, and the exchange of information which a technological environment has to offer. The link-ups between firms, even core firms, tend to operate autonomously and competitively.

Typical examples of this type are the small high technology firms in Silicon Valley and Route 128 in the United States (Saxenian 1985, 1989), and also in the technopoles and science parks in Europe (Komninou et al. 1990). The branches of production which fall into this category are chiefly electronics, pharmaceuticals, biotechnology, telecommunications, aircraft construction, and space technology.

Type 3: The Small Subcontracting Firm

The decentralization of production, a consequence of the growing importance of production in small batches, has led to an increase in subcontracting relations and hence to an increase in the importance of small subcontracting firms. But, in contrast to the two preceding types of autonomous small firm, the relatively classic Fordist form of subcontracting still survives in much of production.

The subcontracting firm, which is strongly dependent on other firms, is thus a third type of small company. It is characterized by relatively traditional technology and a low level of innovative activity and skilled labour, but it is exceptionally flexible in the regulation of labour relations in terms

of pay, working hours, and occasional and seasonal work. This flexibility makes it possible to produce to order — comparatively cheaply, owing to low labour costs — individualized unlabelled products for firms with a name. There are many firms of this type in the clothing and automobile sectors.

They may be centralized around a single large firm with external economies, thus forming a “cloud” of subcontracting companies with one-dimensional relations of power and dependence with the core firm and no link-ups with each other (as in the case of Toyota City); or they may be scattered around low-wage areas, entering into agreements with various customers and agents.

ALTERNATIVE FLEXIBILITY STRATEGIES

The foregoing outline of the various types of firms in relation to flexible production clearly shows the variety of forms of restructuring of industrial production. Let me now look at alternative possibilities and applications of flexible strategies at four levels of organization: interfirm networks, production organization, the labour market, and innovation.

Level of Flexibility: Interfirm Networks

From what has been said above, it follows that flexible production through the setting up of networks is not a universally employed strategy. It applies to firms that operate on the basis of external economies. Networks are thus a feature of vertically disintegrated, flexible mass production, niche markets, high technology, and some subcontracting firms (see fig. 1, col. 1).

Networks themselves vary widely in the manner of their organization and operation, according to the types of firms involved.

In core firms, the network arises either out of the fragmentation of production in relation to external economies of scope or out of the partial decentralization of production in relation to external economies of scale. As far as external economies of scope are concerned, the high division of labour is connected with the fact that the greater the firm's diversification and the broader the range of products and services, the more there is to be gained from dividing up the firm's productive and administrative structure (Holland 1990). As for external economies of scale, the point of partially externalizing production is to gain flexibility from an external scope system (the supply of diversified products), while still retaining the advantage of internal economies of scale.

As far as small firms are concerned, strategic organization in networks enables niche markets and high technology firms to dominate in fragmented

markets, while the small firms' dependent links with large firms broaden the subcontractor's range of activity. Here too, however, networks differ significantly. In the case of firms in niche markets, the network consists of small and medium-sized spatially centralized companies, which, by externalising their production, become specialized in different stages of production and develop cooperation with other firms without formal hierarchies and power relations. Through the network, the firms become more flexible and efficient, because the whole thing functions as a single production unit (Becattini 1991). The network organization in the case of high technology firms is different, however. It does not focus on local complexes, for the networks are international (to facilitate the exchange of technical knowledge and personnel) (Cooke 1988). The networks to which subcontracting firms belong arise mainly out of the externalization of large firms' production. They do not involve cooperative relations between the subcontractors themselves, but hierarchical relations with the larger units.

Level of Flexibility: Internal Organization of Production

With the exception of the subcontractors, which use more traditional technology, all the other types of firm incorporate flexible technology. However, the degree of automation they introduce, the uses to which flexibility is put, and the relations between workers and production all vary (see fig. 1, col. 2).

In large firms which implement technical flexibility, the trend towards full automation leads to neotaylorist forms of organization: that is, to the disengagement of the worker from the production process. Production organization takes the following form: flexible technology — full automation — limited worker involvement — inflexible labour organization (e.g., the case of Fiat).

In large firms which implement vertical disintegration and flexible mass production, on the other hand, the introduction of flexibility leaves plenty of room for manoeuvre and for worker involvement and is thus linked with a flexible organization of labour, as in the case of the Japanese automobile industry. Production organization takes the following form: flexible technology — worker involvement — flexible labour organization.

In the case of small firms in niche markets, the use of new technology in combination with flexible labour organization gives greater opportunities to respond to changes in demand. It also paves the way for new markets for small high technology firms. Production organization takes the same form as in firms which implement vertical disintegration and flexible mass production.

In contrast, relatively little use of new technology, allied with a lack of mutual cooperation, on the part of subcontracting firms blocks access to individual markets and limits the possibilities of production to order. Nevertheless, flexible organization of labour, which is chiefly based on the workers' technical skill, intensiveness of labour, and a less hierarchical administrative structure enable the subcontracting firm too to respond rapidly to variations in demand. Production organization takes the following form: traditional technology – worker involvement – flexible organization of labour.

The variety of applications of flexible organization of production does not relate only to the different types of firms, but also to the possibility of combining different types of production within a single unit, according to the types of product, the corresponding markets, and the production stage (Coriat 1991). Renault, for instance, especially for the manufacture of small and medium-sized batches of composite parts (such as HGV gear boxes), and in order to ensure better quality and to reduce costs by reducing transfer time, has done away with the classic transfer process and created the *ateliers flexibles*, which comprise a fully automated system for transporting tools and parts to the assembly machines (Le Maitre 1982; Lasfargue 1982). Matsushita (which produces video cassettes recorders) has adopted a combination of production lines: the classic production line for the standardized parts of products, specific assembly lines for final products destined for large specialized markets, and the multipurpose line for diversified products destined for smaller markets (Coriat 1991).

The same technology may also incorporate different forms of labour organization with corresponding effects on skill levels. In many engineering workshops, the introduction of computer numerical control machines saw a restructuring of the labour process based on the work force's existing specialization structures and led, through training programmes, to the formerly skilled technicians and operators' being upgraded so that they could undertake grade one maintenance and programming tasks. In the same context, the existing unskilled labour remained unskilled, now doing jobs such as monitoring machinery and installing and moving tools (see the cases reported by Hendry 1990). At Renault, three different systems of labour organization within the same company demonstrate the effects on skills and the conflicting phenomena of robotics. In the *atelier flexible* at the Boutheon factory, the operator is restricted to the simple task of supervising three machines simultaneously; on the integrated production lines at the Cleon factory, the taylorist division of labour has been replaced by a group of multiskilled workers capable of operating the machines; and the operators of the numerical control machine tools are divided into deskilled (surveillance and feeding) and multiskilled (programmers) (Lasfargue 1982).

Level of Flexibility: Labour Market

The strategies relating to the labour market (wage contracts, duration of work) also vary according to the type of firm. Lipietz (1992) ranks these strategies on a scale ranging from great flexibility (free adjustment of the wage contracts through market regulation) to very limited flexibility (rigid wage contracts through social regulation) (see fig. 1, col. 3).

In large firms, flexible negotiation of the wage contract, in a neoliberal and neotaylorist context, is encountered in the fully automated factories of companies with technical flexibility. On the other hand, in firms implementing vertical disintegration and flexible mass production, worker involvement entails a marginal flexibility in its market terms. The lifetime employment of the multiskilled workforce of Japanese firms is a classic example of a relatively inflexible labour market.

As far as small companies are concerned, the labour market is more flexible in high technology and subcontracting firms, through market regulation, and more inflexible in niche markets firms, through collective social regulation. In high technology firms flexibility relates to the free movement of a highly-skilled workforce, while in subcontracting firms it relates to reduced employment and occasional and part-time employment in accordance with fluctuating demand.

However, one single strategy is rarely fully implemented in the labour market. It is usually a question of a combination of strategies relating to variations between production units and production stages in one firm and between the workers' levels of skill.

In the context of intrafirm industrial relations, for instance, the introduction of new technology and new labour organization systems have directly affected the workers' skills and created a new duality in labour relations (see Bluestone and Harrison 1988; Hakim 1989). Formerly craftsmen or skilled technicians (the tailor in the ready-to-wear clothing industry, for example, or the skilled machine operator producing machine tools) have been deskilled, while the positions of machine-computer operators, programmers, and maintenance staff have been upgraded.

Level of Flexibility: Innovations

In all core firms, innovations concern both the process and the product. However, the way in which the innovations are developed varies according to the type of firm. A clear distinction may be made if they are effected within the firm or through networks of firms (see fig. 1, col. 4). A technically flexible firm with internal economies of scale and scope tends to follow the first process. In vertically disintegrated and flexible mass

FIGURE 1
Levels of Flexibility and Types of Firms

<i>Types of firms</i>	<i>Networks</i>	<i>Levels of flexibility</i>		
		<i>Organization of production</i>	<i>Labour market</i>	<i>Innovations</i>
Large vertically disintegrated	External economies of scope Expanded networks	Flexible technology Flexible labour process	Rigid wage contracts Numerical inflexibility	External Process and product development
Large flexible mass production	External economies of scale Partial de-centralization	Flexible technology Flexible labour process	Rigid wage contracts Limited numerical flexibility	External Process and product development
Large technically flexible	Internal scope/scale economies Limited networks	Flexible technology Inflexible labour process	Flexible wage contracts Numerical flexibility	Internal Process and product development
Small niche market	External economies of scope Collaboration Equal relations	Flexible technology Flexible labour process	Rigid wage contracts Numerical inflexibility	External Process development
Small high technology	External economies of scope Strategic alliances Equal relations	Flexible technology Flexible labour process	Flexible wage contracts Numerical flexibility	External Product development
Small subcontracting	Internal economies of scope Hierarchical power structures Limited networks	Traditional technology Flexible labour process	Flexible wage contracts Numerical flexibility	Lack of innovation

production firms with external economies of scope and scale, on the other hand, innovations are developed through strategic alliances between firms for joint R&D programmes (Cooke 1988).

Innovation is important for diversification of production, and consequently for the competitiveness of small niche market firms and high technology firms. Both these types of companies develop innovations in both process and product. However, in the strictest sense of the term "innovation" (the creation of new products or new methods), niche market firms in the traditional sectors tend to favour process innovations, while high technology firms in new sectors go for product innovations (Holland 1990). In subcontracting firms, innovations are not a significant aspect of the production terms.

CONCLUSIONS

The Variety of Flexible Organization of Production

The conclusion arising out of the foregoing analysis is that the present stage of transition to new flexible forms of production organization is characterized by variety and relativity, and points to the various paths which industrial development can follow.

In the context of this variety of models of industrial development, the much-discussed distinction between flexible specialization and mass production misses the point of the changes which are taking place today, nor does it offer a point of comparison for the survival of one or another form of production. Both are feasible forms, with different possibilities and prospects.

Far from becoming less important, mass production firms with economies of scale are gaining strength through the opportunities for flexibility which the new technologies offer. Nor has the demand for mass products fallen; it has in fact risen, owing to "demand replacement" and the production of diversified mass products (Gertler 1988). The fact is, as Coriat (1991) notes, that wherever there is increased demand, even for diversified products, it is the mass economies of scale which predominate.

In fragmented markets serving individualized demand, on the other hand, there are better opportunities for smaller firms orientated towards specialized fields and products.

The Strategic Choices Made by Firms

The variety of forms of flexible restructuring is the result of strategic choices made by firms in the context of the macro and micro socioeconomic

circumstances in order to achieve maximum returns, increased productivity, competitiveness, and a way out of the recession. As Amin and Robins (1990) point out, the development of new forms of production is not preordained, nor does it depend on an overwhelming structural transformation. It arises out of the social struggle and the role of various agencies in the total change, and leads to diversified company strategies. Different social relations, interfirm power relations, institutions, and workers all play a leading part in the form and features of each type of production organization. Thus, different firms employ different strategies; but the same firm may also bring a number of different strategies into play, according to the socioeconomic context in which it operates.

In the final analysis, it is a combination of flexible and well-worn strategies which responds to the quest for more efficient methods of production and competition. A typical example of the adoption of different strategies in the local factories of the same company is given by General Motors. According to Meyer (1986), at "Buick City" in Michigan, a just-in-time system is used for supplies, with the result that stockpiling costs have fallen by 80% and a large number of new supply firms have opened in the broader area. At the Orion and Missouri factories, labour is organized in small work groups and the posts of supervisor and head controller have been abolished. The Saturn programme in Tennessee incorporates all the aforementioned forms of flexible organization, plus direct worker involvement in machine-programming and decision-making, even for the company's macroeconomic strategies, through collaboration between union and management.

Another typical feature of the opportunities for alternative choices is the diverse applications of one and the same technology. The flexible machine does not determine a single organization system, but can be a factor in many strategic choices. This has also to do with the bargaining ability of the workers' representatives. For instance, the introduction of computerized numerically controlled machine tools can offer three alternative systems relating to the operator's role and the division of labour among operators and O&M offices: (i) in the case of the unskilled worker, the programming can be done by the O&M offices, while the operator merely supervises, adjusts tools, and assembles parts; (ii) in the case of the skilled worker, the programming can be done by the O&M offices, but the operator is capable of direct intervention and reprogramming, according to production needs; and (iii) in the case of the multiskilled worker, the programming can be carried out and modified by the operator (Lasfargue 1982). Which system is adopted depends on broader regulations and conflicts between employment and labour strategies.

Alternative strategies are a particularly important point for the various forms of restructuring of industrial production in different countries. Specific

strategies could be adopted on the basis of the different models of company restructuring outlined above and the specific characteristics of the companies in each country. But in each case, the possibilities and the forms of restructuring require systematic exploration.

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RÉSUMÉ

Flexibilité et nouvelles stratégies d'entreprises

Nous discutons ici des formes variées de stratégies d'entreprises développées dans le cadre de la restructuration industrielle et de la transition vers la production flexible. Nous démontrons que cette transition vers de nouvelles formes d'organisation de production ne mène pas à un modèle uniforme de développement. Elle est plutôt caractérisée par la variété et la relativité, pointant ainsi vers les différents chemins que la restructuration industrielle peut suivre.

L'analyse se concentre sur des stratégies de production flexible développées dans des entreprises à différents types et stades de production. Il ne s'agit pas ici d'établir une typologie exhaustive des stratégies, mais plutôt d'élaborer le concept de variété dans l'organisation flexible de la production. Les stratégies des firmes sont classées selon la taille de l'entreprise et la structure organisationnelle. Pour chaque type de stratégie, nous analysons quatre options : les réseaux interfirmes, l'organisation interne de la production, le marché du travail et l'innovation.

Dans le contexte de cette variété de modèles de développement industriel, nous distinguons entre différents types de firmes ayant implanté différentes formes d'organisation de la production. Dans les grandes entreprises, on retrouve trois types de résultats.

La grande entreprise verticalement désintégrée. Cela implique la conversion d'économies internes de gammes ou de variété (la production d'un volume important de produits variés et reliés) en économies externes de variété. La principale caractéristique ici est d'accroître l'externalisation de la production et l'exploitation des économies de variété en fragmentant le processus de production en unités et stades séparés et en opérant à l'intérieur d'unités de production plus petites et plus flexibles.

Les réseaux interfirmes jouent un rôle important dans la structure organisationnelle de ce type d'entreprise. De plus, la technologie flexible est combinée avec l'implication du travailleur dans la production, tendant ainsi à établir des contrats rigides de salaires. D'un autre côté, les innovations portent tant sur le processus que sur le produit.

La grande entreprise flexible de production de masse. Cette catégorie comprend des entreprises à économies d'échelle qui combinent la production externalisée et la production interne de masse. Elle vise à atteindre un équilibre entre la production interne de masse et l'offre d'une grande diversité de produits ou de pièces. C'est une combinaison d'économies internes d'échelle et d'économies externes de variété du système de production à travers une décentralisation partielle.

Le développement d'un réseau interfirme par une collaboration serrée et des contrats avec d'autres firmes, surtout petites, joue un rôle important dans la production et l'offre de pièces de remplacement, d'accessoires, de composantes et dans l'innovation du produit. L'organisation interne de la production ressemble à celle du type précédent en ce que la flexibilité est combinée avec l'implication des travailleurs dans la production. Cependant, les contrats salariaux sont ici plus flexibles vu que les négociations collectives se font surtout au niveau de l'entreprise.

La grande entreprise techniquement flexible. Ici, il s'agit d'économies internes d'échelle ou de variété. La restructuration du processus de production origine surtout des changements dans l'organisation interne de l'unité par l'automation flexible et l'automation programmable.

On obtient la flexibilité en restructurant l'organisation interne de la production en relation avec les nouvelles technologies plutôt qu'avec des réseaux interfirmes. Les innovations proviennent de l'intérieur de la firme. La flexibilité par l'automation programmable se rend souvent à l'automation complète. Cela donne priorité à la machine flexible plutôt qu'au travailleur flexible. Le résultat en est que les opérateurs sont moins susceptibles d'être impliqués dans le processus de production. Cette vision technique du travail ramène des relations industrielles tayloristes combinant une flexibilité fonctionnelle limitée à un marché du travail aux contrats salariaux flexibles.

Dans les entreprises plus petites, il est aussi possible d'identifier trois types d'activités et de développement.

La petite entreprise à créneau spécialisé. Il s'agit de firmes relativement petites produisant de petites quantités de produits diversifiés de haute qualité et de haut design destinés à des marchés segmentés. Elles ont l'avantage de satisfaire les exigences de demandes individualisées en privilégiant la production par métier basée sur les habiletés techniques des travailleurs et sur de petites quantités de production.

Le système est fondé sur de grands réseaux serrés de collaboration entre des firmes interdépendantes spécialisées dans différents stades de production. Les relations de travail dans ces unités sont basées sur l'organisation flexible du travail. Le marché du travail, influencé par des paramètres sociaux plus larges, tend à reposer sur des contrats salariaux rigides. Les entreprises à créneaux spécialisés dans les secteurs traditionnels favorisent plus l'innovation des processus que l'innovation dans les produits.

La petite entreprise à haute technologie. Il s'agit ici de petites entreprises spécialisées orientées vers la recherche et le développement pour promouvoir l'innovation dans des produits de haute technologie. Elles sont capables de créer, par des innovations constantes de haute technologie, de nouveaux marchés spécialisés en combinaison avec une grande flexibilité

dans l'organisation de la production à l'intérieur des unités et une organisation flexible des réseaux interfirmes sur la base d'alliances stratégiques.

Ces réseaux sont cependant différents du précédent. Ils ne se centrent pas sur le plan local mais plutôt sur le plan international afin de favoriser l'échange de connaissances techniques et de personnel. En ce qui a trait aux relations industrielles, ces entreprises font preuve de flexibilité dans l'organisation du travail et sur le marché du travail eu égard à la libre mobilité de la main-d'œuvre hautement spécialisée. Ces entreprises sont orientées vers l'innovation du produit.

L'entreprise sous-traitante. Celle-ci est caractérisée par une technologie relativement traditionnelle et par un bas niveau d'activité d'innovation et de main-d'œuvre qualifiée. Elle est cependant flexible dans sa régulation de la paie, des heures de travail et du travail saisonnier ou occasionnel. Une forme relativement fordiste classique de sous-traitance survit dans l'organisation de la production.

Les réseaux auxquels ces entreprises appartiennent proviennent surtout de l'externalisation de la production de grandes firmes. Ils n'impliquent pas des relations de coopération entre les sous-traitants eux-mêmes mais plutôt des relations hiérarchiques avec des unités plus larges. L'organisation de la production prend la forme suivante : technologie traditionnelle, implication des travailleurs et organisation flexible du travail. De plus, le marché du travail est ici très flexible. Cela implique une baisse d'emplois et la présence d'emplois occasionnels et à temps partiel selon les fluctuations de la demande. D'un autre côté, les innovations ne sont pas un aspect significatif de la production.

Nous concluons que les choix stratégiques des entreprises sont plus influencés par des facteurs sociaux-économiques locaux que par des modèles globaux. De plus, il y a plusieurs formes de flexibilité avec différentes possibilités et perspectives à travers les différentes entreprises, phases et stades de production.